# A Flash Flood Warning System for Fort Hood, Texas

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# Project Team

- Dennis Hoffman –TAES, Project Leader
- June Wolfe – TAES, Project Manager
- Dennis Herbert – DPW,  Project Coordinator
- Jerry Paruzinski – G3, Project Coordinator
- Fred Schrank – NRCS, Project Coordinator

# Original Project Description

**Providing land management evaluation**

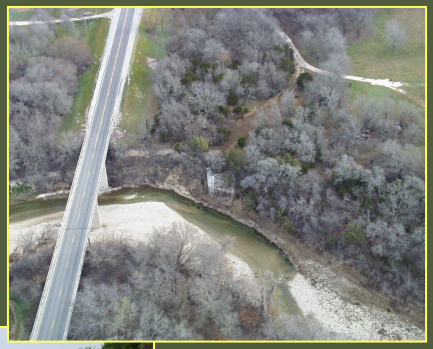
**based on water quality**

# Additional Capability

**Providing automated flood warning during storm events**

# Monitoring Sites

- **Thirteen locations**
  - **Six operational (budget constraints)**
    - **Sediment analysis**
- **Two Locations**
  - **Additional capability**
    - **Automated flood warning via cellular telephone connection**



# Precipitation and Stream Flow Monitoring

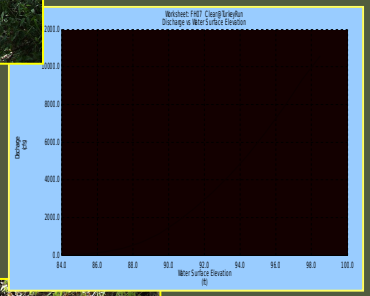
- Stream monitoring
  - ISCO 4230 bubble flow meter

- Storm sampling equipment
  - ISCO 3700 auto sampler

- Precipitation monitoring
  - Tipping bucket rain gau
    - Texas Electronics TRP-525

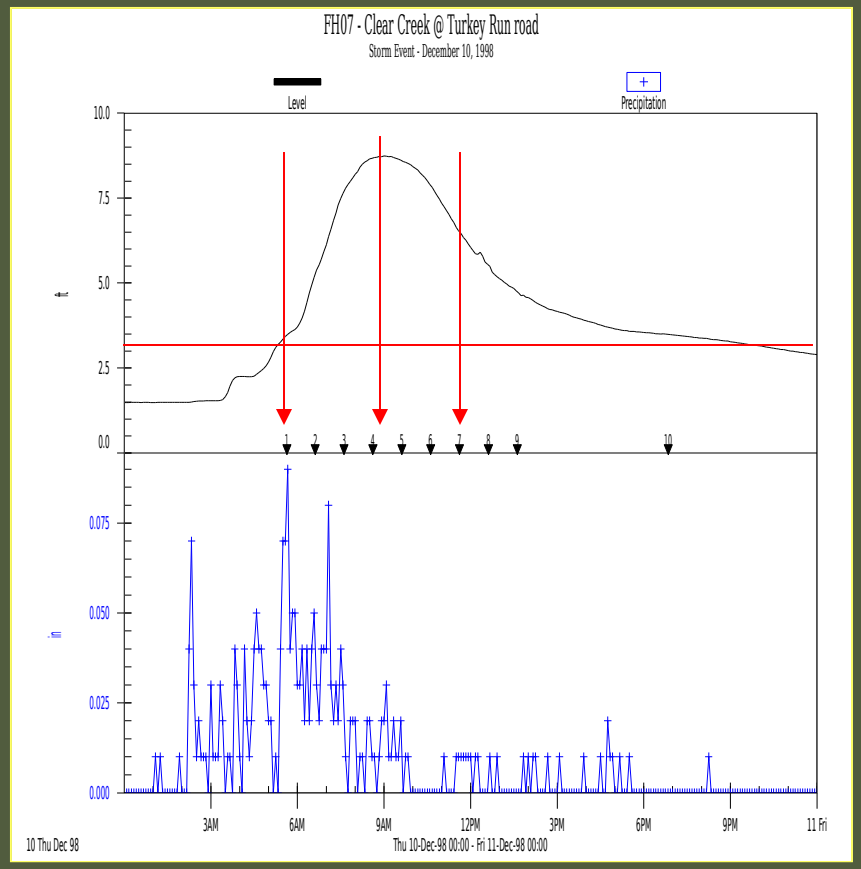
# Stream Flow Determination

- Site survey
  - Cross-section
  - Stream slope
  - Channel roughness
- Manning formula
  - level to flow
  - flow to volume



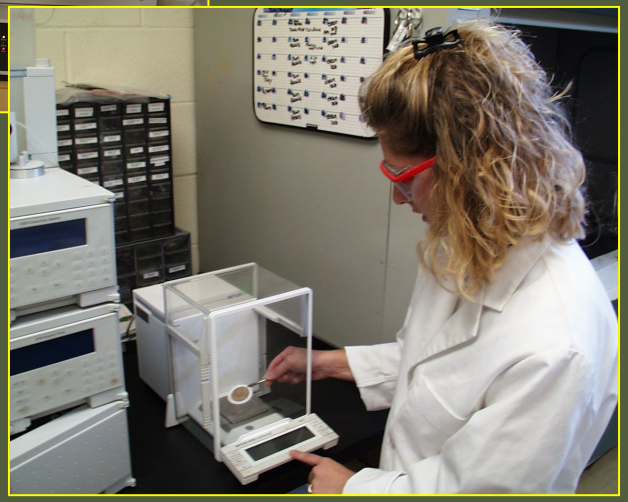
# Storm Runoff Sampling Technique

- **ISCO 4230 Flow Meter**
  - **Stream flow history**
  - **Precipitation history**
  - **Sample history**
- **ISCO 3700 Sampler**
  - **Time based sampling**
  - **Three samples analyzed per event**

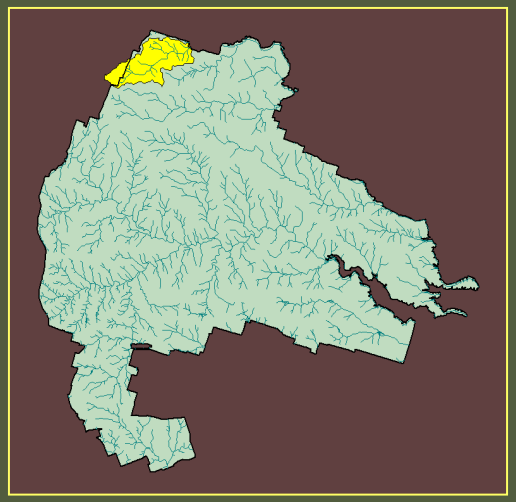


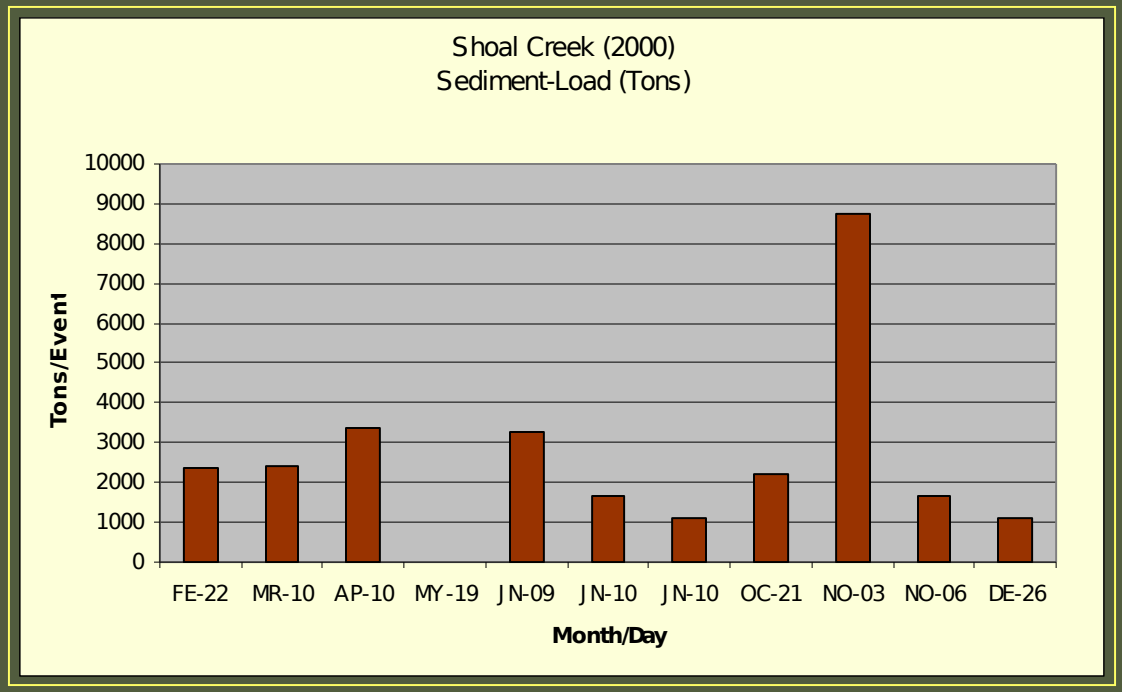
# Laboratory Analysis

- **Sediment analysis**
  - **Total Suspended Solids (TSS)**
  - **Gravimetric measurement**
  - **Combined with flow volume to estimate loading**



# Sediment History for Shoal Creek Watershed

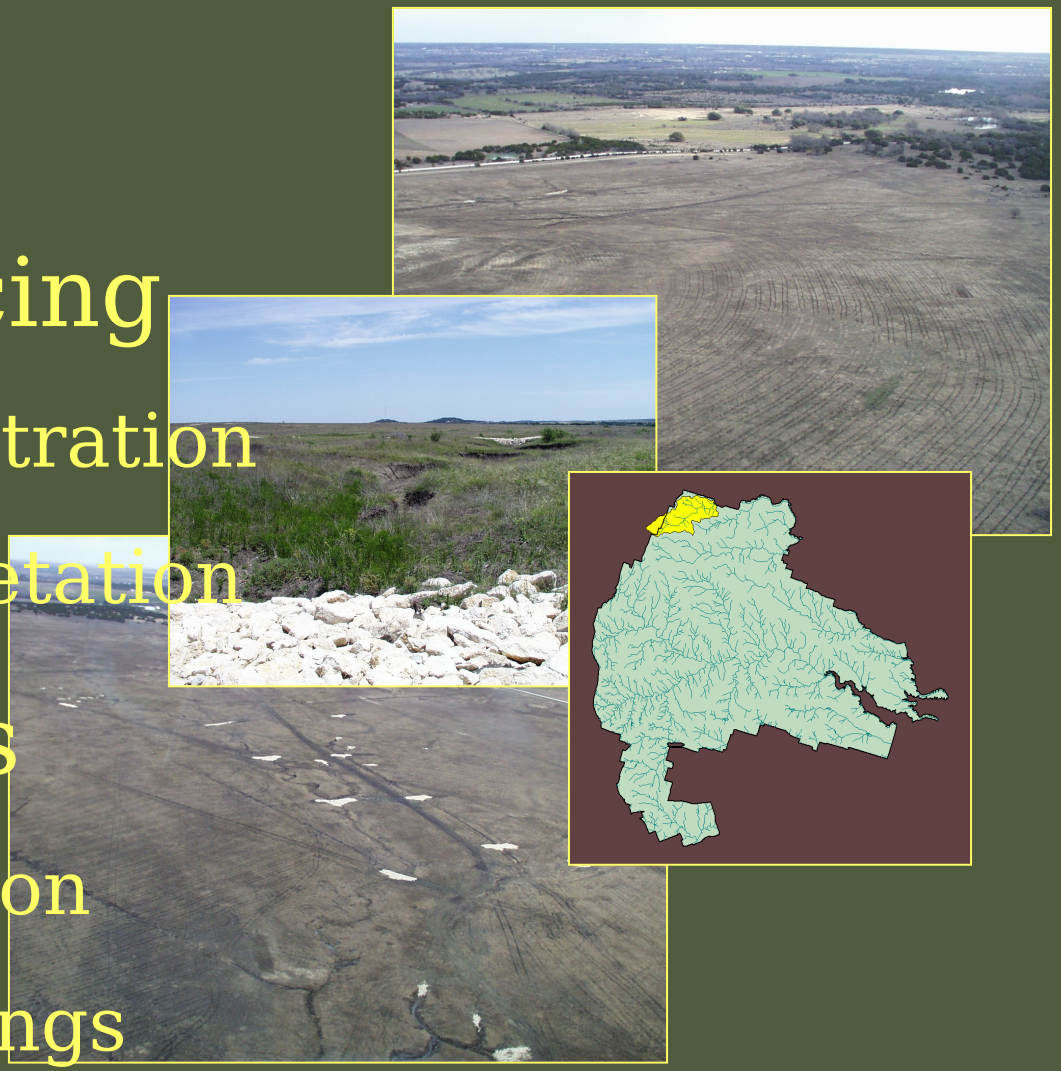





Continuous monitoring since 1997

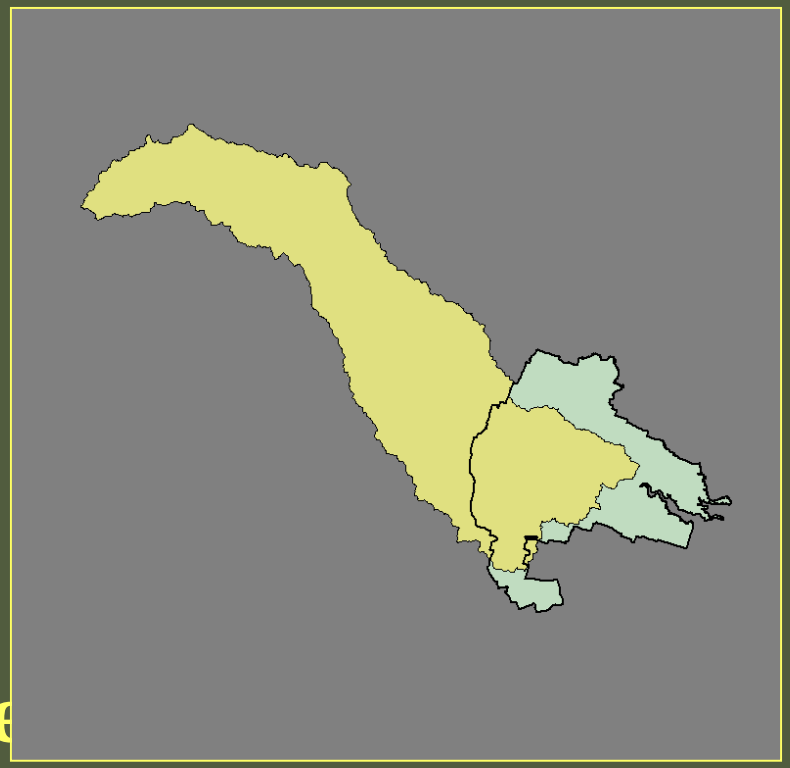
# Recent Shoal Creek BMPs

- Soil ripping/terracing
  - –Increased infiltration
  - –Improved vegetation
- Check Dams
  - –Reduced erosion
  - –Provide crossings
  - –Fill channels



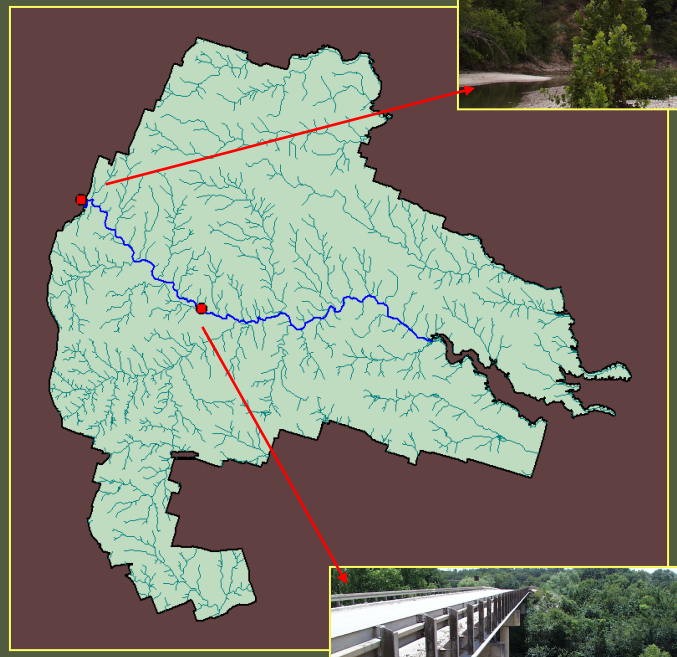
# Cowhouse Creek Drainage

- **Cowhouse Creek**
  - **main drainage**
  - **~ 117746 Acres**
- **Flooding History**
  - **rapid response**
  - **numerous fatalitie**



# Flood Warning Locations

- **Upstream**
  - **FM 116 @ Pidcoke**
- **Downstream**
  - **West Range Road**
- **Distance / Time**
  - **~ 7.5 river miles**
  - **~ 45 - 50 minute lag**

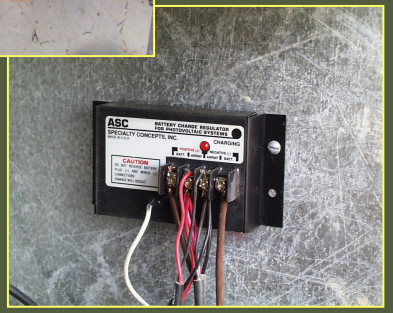


# Flood Warning Equipment

- **ISCO 4320 Bubble Flow Meter**
- **ISCO 5430 Voice Modem**
- **Motorola  2XKA Cellular Telephone**
- **Motorola S1936D  Cellular Connection**

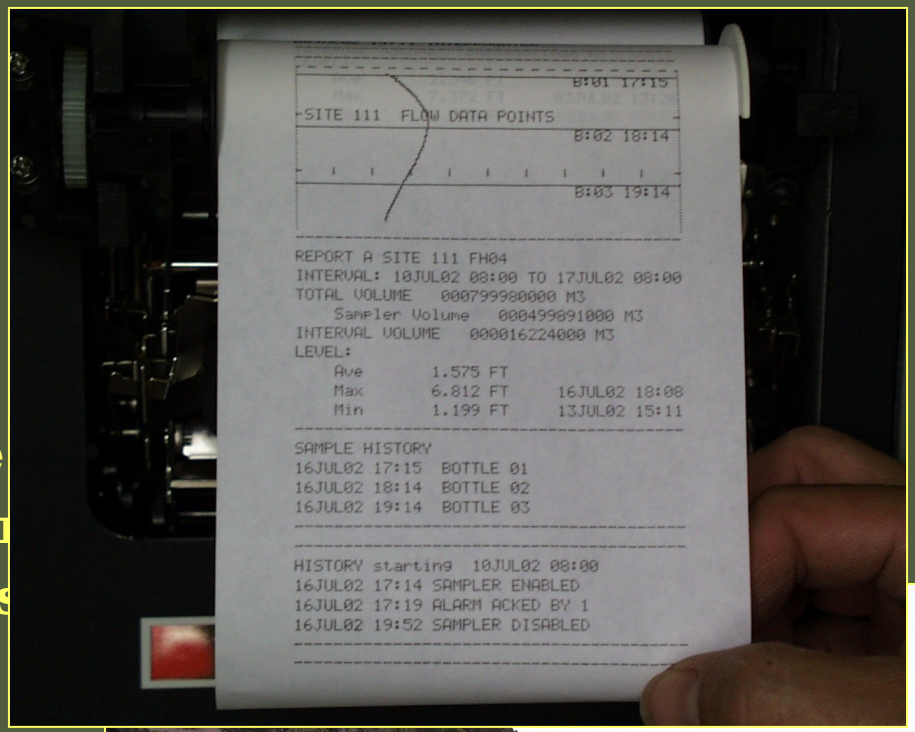
# Installation

- **Physical**
  - **Equipment housing**
  - **Bubble outlet**
- **Power**
  - **12 V solar panels**
  - **12 V batteries**
  - **charge controller**
- **Antennas**
  - **Internal**
  - **External**



# Operation

- **Programming**
  - **User determined enable**
  - **Time delay (false trigge**
  - **Multiple phone number**
- **Acknowledgement**
  - **Voice alarm**
  - **Acknowledge code**
  - **System reset**
  - **Physical closing of crossings**


SITE 111 FLOW DATA POINTS
REPORT A SITE 111 FH04
INTERVAL: 10JUL02 08:00 TO 17JUL02 08:00
TOTAL VOLUME 000799980000 M3
Sampler Volume 000499891000 M3
INTERVAL VOLUME 000016224000 M3
LEVEL:
Ave 1.575 FT
Max 6.812 FT 16JUL02 18:08
Min 1.199 FT 13JUL02 15:11
SAMPLE HISTORY
16JUL02 17:15 BOTTLE 01
16JUL02 18:14 BOTTLE 02
16JUL02 19:14 BOTTLE 03
HISTORY starting 10JUL02 08:00
16JUL02 17:14 SAMPLER ENABLED
16JUL02 17:19 ALARM ACKED BY 1
16JUL02 19:52 SAMPLER DISABLED

# Future Activities

- **Continued monitoring**
- **Trend analysis**
- **Early flood warning**

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# Thank You


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